

crests at Chattanooga, 28.5 feet on January 20; 26.8 feet on January 27; and two also at Gunter'sville, 28.0 feet on January 22, and 28.5 feet on January 28. At Decatur, located in the reservoir of Wheeler Dam, the stage was maintained at or above 17 feet until February 6, with a second peak of 23.9 feet on January 25. Resulting crests at the stations in the Cairo district were: 19.2 feet at Florence on January 26; 40.9 feet at Riverton on January 27; 42.2 feet at Savannah on January 27 and 28; and 41.0 feet at Johnsonville on January 25. The last named was much influenced by backwater from the Ohio River at Paducah, Ky. These crests were considerably under previous records. They were probably reduced to some extent by storage in the reservoirs in the upper portion of the Tennessee River.

After the Missouri floodway went into operation, the river at Cairo fell from 58.6 feet on the afternoon of the 25th to 57.9 feet on the morning of the 28th, and then resumed rising at a slower rate as a result of the greater spread of water, a condition which had been anticipated and forecast. The rate of rise decreased materially as far upstream as Paducah, Ky. This decrease was aided by the overbank flooding of the Cache River Basin. Water from the Ohio River backed up Big Bay Creek, whose outlet is 8 miles below Dam No. 51, overtopped the ridge separating it from the Cache Valley, and followed the course of the latter across the northern portions of Massac and Pulaski Counties in Illinois, then cutting across southern Alexander County, entered the Mississippi River some 10 or 12 miles northwest of Cairo. This course is said by historians to have been an abandoned valley of the Ohio River; at that time the united Cumberland and Tennessee Rivers followed the present course of the Ohio from Paducah to Cairo. A range of low hills separates the two basins.

For the three periods shown in the table the average daily precipitation at Cincinnati, Ohio, was 0.17 inch for the first period; 0.57 inch for the second period; 1.04 inches for the third period; at Louisville, Ky., 0.34 inch for the first period; 0.62 inch for the second period; 1.47 inches for the third period; from Evansville, Ind., to Dam No. 49, 0.22 inch for the first period; 0.70 inch for the second period; 1.12 inches for the third period; from Dam No. 50 to Paducah, Ky., 0.37 inch for the first period; 0.47 inch for the second period; 1.44 inches for the third period; from Dam No. 52 to Cairo, Ill., 0.38 inch for the first period; 0.54 inch for the second period; 1.39 inches for the third period.

It will be seen that the precipitation for the last period was considerably heavier than the two preceding periods combined. The daily rate of rise in the river therefore was much greater in the last period, January 19 to 24, than in the preceding period, January 11-18, inclusive: Evansville, Ind., 1.1 as compared to 1.0; Dam No. 48, 1.3 as compared to 1.1; Dam No. 49, 2.1 as compared to 1.1; Dam No. 50, 2.2 as compared to 1.2; Dam No. 51, 1.9 as compared to 1.0; Paducah, Ky. (United States Reservation gage), 1.9 as compared to 0.7; Dam No. 52, 1.8 as compared to 0.7; Dam No. 53, 1.6 as compared to 0.8; Cairo, Ill., 1.5 as compared to 0.9 foot.

Counting from December 30, 1936, the total amounts of rise to the crests, Evansville to Cairo, were as follows: 39.55 feet at Evansville; 43.6 feet at Dam No. 48; 48.9 feet at Dam No. 49; 51.6 feet at Dam No. 50; 46.0 feet at Dam No. 51; 46.6 feet at Dam No. 52; 43.2 feet at Cairo. This interesting bulge from dam no. 49 to Dam No. 50 was due largely to a constriction in the river extending from the mouth of the Saline River in Illinois to below Golconda, Ill., a distance of about 40 miles, through which the river must pass between high hills varying from 1 to 2 miles apart; these hills being an extension of the Ozark uplift. It was in part due to the water from the Wabash River, which reached a crest of 27.0 feet at Mount Carmel, Ill., on January 23, its rise having been stopped short of the expected crest by the breaking of levees along the White River in Indiana, some 20 miles above its mouth near Mount Carmel, Ill.

At the beginning of the rise counting also from December 30, stages were very low in the Mississippi River below Cairo: 8.5 feet at Memphis, Tenn., and 2.6 feet at New Orleans, La. Such a condition produces a rapid current and ordinarily tends to lower the stages reached from Paducah, Ky., to Cairo Ill. The States west of the Mississippi River, drained by the Missouri, White, Arkansas, and Red Rivers had been suffering from drought for the last three seasons, and contributed no water to produce a super flood.

#### MISSISSIPPI RIVER FROM BELOW NEW MADRID, MO.; TO THE MOUTH OF THE WHITE; ST. FRANCIS RIVER AND TRIBUTARIES

By F. W. BRIST

The record-breaking flood of January and February 1937, from Dam No. 26 to Cairo, Ill., on the Ohio River, and from Cairo, Ill., to Natchez, Miss., on the Mississippi River, was inaugurated by heavy rains attending an energetic area of low-barometric pressure central over Kansas City, Mo., on the morning of December 31. On this

date a steady rise began in the Ohio River from Parkersburg, W. Va., to Cairo, Ill., which was uninterrupted at Evansville, Ind., and points below and only briefly at Cincinnati, Ohio, until the crest stages of the flood were reached.

The crest stages reached in the Memphis district were as follows: Memphis, 48.7 feet on the self-recording gage and 50.3 feet on the Beale Street gage, in use by the Weather Bureau in previous high floods, February 10; Helena, Ark., 60.3, February 11.

The crest stage at Memphis was 3.7 feet higher than the highest previous flood, which occurred in 1913, and 4.3 feet higher than the flood of 1927. At Helena, Ark., the crest was 3.5 feet higher than the previous highest flood, which occurred in 1927.

No breaks occurred in the Mississippi levees in this district below the Bessie, Tenn., cut-off and the damage was confined to the overflow between the banks and the levees and in the backwater areas of the lower St. Francis Basin in Arkansas and the tributaries of western Tennessee.

The river at Memphis was above the flood stage, 35 feet on the Beale Street gage, from January 21 to March 1, inclusive, or a total of 40 days. It was above 40 feet from January 24 to February 25, or 33 days. It was thus continuously above a stage of 40 feet during a longer period than in any flood beginning with 1903, except that of 1922, when it was 45 days. At Helena, Ark., it was above 50 feet from January 26 to March 1, or 35 days, being a longer period than that of any flood beginning with 1903, except in 1922 and 1927, when it was 44 days.

The cut-off at Bessie, Tenn., whereby an undetermined but increasing amount of water flowed across a narrow neck of land in a loop of the river, and the delayed flow of water through the Cairo spillway added about 0.67 foot more to the crest at Memphis than was apparently indicated by the combined waters of the upper Mississippi and the Ohio Rivers.

#### MISSISSIPPI RIVER FROM THE MOUTH OF THE WHITE TO THE MOUTH OF THE BIG BLACK; YAZOO AND BIG BLACK RIVERS AND TRIBUTARIES

By R. T. LINDLEY

Including about 765,000 acres flooded by backwater from the Mississippi River, the total acreage overflowed during January and February in Delta counties of Mississippi, embracing the Black and the Sunflower-Tallahatchie-Yazoo Basins, amounted to about 1,533,700 acres. However, it is estimated that only about one-fifth of the area flooded was in cultivation, and the greater part only sparsely inhabited. Also, it should be borne in mind that agricultural activity was practically dormant at the time of this flood and the loss of actual and prospective crops was not great.

A large item of expense was incurred in the evacuation of the region, furnishing subsistence and quarters for the families during the continuance of the flood, and the loss of productive labor.

#### MISSISSIPPI RIVER BELOW THE MOUTH OF THE BIG BLACK; RED RIVER BELOW SHREVEPORT, LA.; OUACHITA AND BLACK RIVERS AND TRIBUTARIES IN LOUISIANA; ATCHAFALAYA RIVER

By W. F. McDONALD

The Bonnet Carre spillway located 23 miles above New Orleans, La., was opened by the United States Engineers late in January, and at maximum discharged over 200,000 cubic feet per second from the river into Lake Pontchartrain. The lowering of the stage at Carrollton gage (New Orleans) is estimated to have been not less than 3 feet due to operation of the spillway.

The State and United States Engineers waged an intensive fight to hold levees. Their efforts were completely successful. Notwithstanding the fact that at Natchez, Miss., a new record stage almost 2 feet above previous records was experienced, there was no levee failure. The Natchez crest stands out as the only instance on the Mississippi River below Helena, Ark., in which a new record stage was established. This local peak at Natchez was undoubtedly due to the action of the 12 cut-offs in the Mississippi River between the mouths of the Arkansas and Red Rivers, which operated to depress stages on the upper reaches affected but produced a new high record at Natchez. Below the latter point, crests on the Mississippi River were from 1.0 to 2.8 feet below the previous records established in 1927, while on the Atchafalaya, the crest was 4.1 feet below the previous record at Simmesport, La.

This pronounced discrepancy in the development of the crest in the Mississippi River at and below Angola, La., as compared with the Atchafalaya River, was due to the very fortunate circumstance that the backwater basin in Louisiana, lying to northward of the